

OPISTHOBRANCHS FROM NORTHERN BRAZIL

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ABSTRACT

A collection of 40 species of opisthobranchs brought together by Dr. Marc Kempf from the northern coasts of Brazil to depths of 370 m, increases the list of Brazilian opisthobranchs (Marcus, 1964; 1969a) by 14 known and 3 new species, one of which is allotted to the new genus *Percunas*. The new species are *Chromodoris kempfi*, *Hypselodoris marci*, and *Percunas mulciber*. Twelve of the species new for Brazil previously were known from the Caribbean, one from Cape Horn, and one from the Mediterranean Sea. This account covers 24 of the species obtained.

Those which need no comment are not mentioned.

INTRODUCTION

Dr. Marc Kempf of the Laboratório de Ciências do Mar, formerly the Oceanographic Institute, of Recife entrusted my late husband and me with the classification of his rich material of opisthobranchs, mainly Cephalaspidea, of which many samples contained well-preserved animals for anatomical studies. These gastropods were collected by Dr. Kempf and by the ships AKAROA, ALMIRANTE SALDANHA, and CANOPUS, in the years 1965 to 1967, off the Brazilian coast, from 05°N to 11°19'S, in depths down to 370 m. The dredging in water deeper than our own collecting on the coast of São Paulo, and the location of the stations on the almost unexplored north coast of Brazil have resulted in one genus and three species new to science, as well as 14 species new for Brazil. I thank Dr. Kempf for the opportunity to study his valuable collection.

This is the first report that I have published without the help of my dear husband, whose share it always was to compare the material with the literature and to edit the text, while I did the preparation, reconstruction, and drawings of the specimens. I hope that I have maintained his descriptive standards, but I am certainly not able to deal with the literature as supremely as he did.

The material is kept in the Collection of the Department of Zoology, F.F.C.L., University of São Paulo.

LIST OF SPECIES

CEPHALASPIDEA

1. *Acteon cumingii* A. Adams, 1854. Figs. 1-2.
2. *Acteon danaida* Dall, 1881. Figs. 3-4.
3. *Acteon punctostriatus* (C. B. Adams, 1840). Fig. 5.

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5. ? *Ovulacteon meeki* Dall, 1889. Fig. 9.
6. *Scaphander darius* Marcus, 1967.
7. *Cylicina discus* Watson, 1883. Fig. 8.
8. *Philine* cf. *infundibulum* Dall, 1889.
9. *Micromelo undata* (Bruguière, 1792).
10. *Cylindrobulla beau* P. Fischer, 1856.
11. *Atys riiseanus* Mörch, 1875. Figs. 10-18.
12. *Atys caribaeus* d'Orbigny, 1841. Figs. 19-24.
13. *Atys m'andrewii* E. A. Smith, 1872. Figs. 25-28.
14. *Haminoea petiti* (d'Orbigny, 1842). Fig. 29.
15. *Akera bayeri* Marcus, 1967. Figs. 31-33.

NOTASPIDEA

16. *Umbraculum plicatulum* (v. Martens, 1881).
17. *Oscanius* (?) *testudinarius* (Cantraine, 1840). Fig. 30.

DORIDOIDEA

18. *Chromodoris kempfi*, spec. nov. Figs. 34-38.
19. *Hypselodoris marci*, spec. nov. Figs. 39-42.
20. *Rostanga byga* Marcus, 1958.
21. *Thordisa diuda* Marcus, 1955.
22. *Discodoris evelinae* Marcus, 1955. Fig. 43.
23. *Discodoris pusae* Marcus, 1955. Fig. 44.
24. *Percunas mulciber*, gen. nov., spec. nov. Figs. 45-49.

CEPHALASPIDEA

The present four species of *Acteon* are represented only by empty shells, but these are consistent with the descriptions and figures given by Pilsbry (1895). I further compared the West Atlantic species of Dall (1927), Aguayo & Rehder (1935), and McGinty (1955); Rehder (1939) was not available.

1. *Acteon cumingii* A. Adams, 1854
Figs. 1-2

Reference.—Pilsbry, 1895: 162, pl. 19, figs. 16, 17.

Material.—Brazil: off Sergipe, 10°41'02"S, 36°20'25"W, and 11°02'20"S, 36°47'40"W, 72-100 m, on mud with detritus and calcareous algae; 3 empty shells.

Further Distribution.—From Florida to Rio de Janeiro, Brazil.

Remarks.—*A. finlayi* McGinty (1955: 81) is similar to *cumingii*, but differs by latticelike sculpture. The southernmost locality for this species is Ubatuba (Marcus, 1970b).

2. *Acteon danaida* Dall, 1881

Figs. 3-4

Reference.—Pilsbry, 1895: 160, pl. 20, fig. 32; Johnson, 1934: 145.

Material.—Brazil: off Alagoas, 9°01'S, 34°51'10"W, 370 m; 4 empty shells, the biggest of which is 10 mm long, 5 mm wide, with an aperture 4.5 mm high.

Further Distribution.—Florida; Tortugas.

Remarks.—The aperture of *A. torrei* Aguayo & Rehder, 1935 (p. 268, pl. 24, fig. 8) is proportionally much longer, $\frac{3}{4}$ of the shell length, and its apex is shorter than that of the present species.

This is a new record for Brazil.

3. *Acteon punctostriatus* (C. B. Adams, 1840)

Fig. 5

Reference.—Marcus, 1958a: 32.

Material.—Brazil: off Maranhao, 01°29'S, 43°19'W, 83 m; one empty shell, 6.8 mm long, 3 mm in diameter.

Further Distribution.—Atlantic coasts of America from Cape Cod to Bahia Blanca, Argentina.

4. *Acteon vagabundus* (Mabille & Rochebrune, 1885)

Figs. 6-7

Reference.—Pilsbry, 1895: 164, pl. 18, figs. 95, 96.

Material.—Brazil: off Alagoas, 9°01'S, 34°51'10"W, 370 m, on detritus with bryozoans; 3 empty shells.

Further Distribution.—Cape Horn.

Remarks.—The species is reported for the first time from Brazil.

5. *Ovulacteon meeki* Dall, 1889 ?

Fig. 9

References.—Pilsbry, 1895: 178, pl. 29, figs. 19, 20; Johnson, 1934: 145.

Material.—Brazil: Recife, Praia da Piedade; one broken shell.

Further Distribution.—Florida; Bahamas; Cuba; 366-823 m.

Remarks.—The heavy shell measures 4 by 2.4 mm and has a well-developed

callus along its inner lip, continued onto the outer lip behind; the anterior end is broken off.

The species is new for Brazil.

6. *Scaphander darius* Marcus, 1967

Reference.—Marcus, 1967b: 603-605, figs. 10-17.

Material.—Brazil: from 5°20'N to 11°02'20"S and 34°53'40"W to 51°14'05"W, 64-130 m, on mud and sand with calcareous algae; 3 animals and 13 empty shells.

Further Distribution.—Caribbean coast off western Colombia, 47-174 m.

Remarks.—The present material differs from the Caribbean specimens in that the greatest diameter of the longest shell (18.2 mm) amounts to 52.2 per cent of the length. The diameter of the biggest of the original shells (21 mm) is only 49.6 per cent of the length. Thus the present material approaches the large *S. pilsbryi* McGinty (1955: 82) already compared in our first description, of which the radula, gizzard plates, and copulatory organs are not known. Bullis (1956: 12, 13) supposed that *S. pilsbryi* is a synonym of *S. watsoni* Dall, possibly of Bullis's subspecies *watsoni watsoni*. In this case *S. pilsbryi* would differ from the present *darius* by its unpaired gizzard plate not being pinched together (Bullis, fig. 5A). If *S. pilsbryi* were united with *S. watsoni rehderi*, the copulatory organ (Marcus, 1967b: figs. 8, 9) would distinguish it from the present animals, in spite of the uniform ratio of the shells.

The amplitude of the color variation of the periostracum exceeds the original indication from cream to light brown, as there are white to mahogany brown ones in one and the same vial of material preserved in alcohol. The median tooth of the radula is 118 μ broad, the lateral tooth 410 μ long; in the Caribbean snails, 82 μ and 350 μ , respectively.

The vitreous ental part of the prostate is set off from the denser outer part. None of the mentioned characters justifies a subspecific separation of the present animals from *S. darius*.

This is a new record for Brazil.

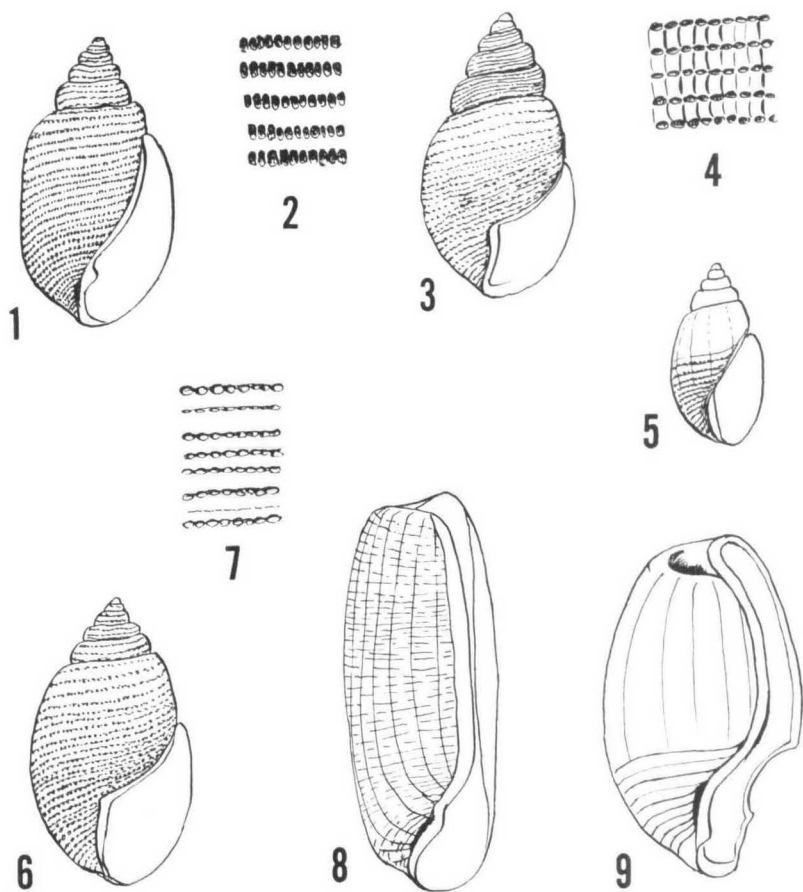
7. *Cylichna discus* Watson, 1883

Fig. 8

References.—Pilsbry, 1895: 299, pl. 30, fig. 7; Clarke, 1962: 39 (*Cylichna discus* and *Cylichna (Bulinella) discus*).

Material.—Brazil: 5°20'N to 9°01'S, 34°51'10"W to 51°14'05"W, 83-370 m; 16 empty shells.

Further Distribution.—Norway; western Europe; Caribbean.



FIGURES 1-9.—1-2, *Acteon cumingii* A. Adams: 1, shell; 2, sculpture.—3-4, *Acteon danaida* Dall: 3, shell; 4, sculpture.—5, *Acteon punctostriatus* (C. B. Adams), shell.—6-7, *Acteon vagabundus* (Mabille & Rochebrune): 6, shell; 7, sculpture.—8, *Cylichna discus* Watson, shell.—9, ? *Ovulacteon meeki* Dall, shell.

Remarks.—The shells are up to 8.4 mm long and 3.2 mm in diameter. The sculpture is variable. Spiral lines are fine or wanting. The axial growth lines are distinct; in four shells they are opaque, alternating with transparent bands. The columellar callus of the inner lip is continued into a fold in front at the beginning of the reflected columella. The largest shell (8.4 mm) comes from the least depth (83 m); it is much bigger than the original material (3.9 mm).

The species is new for Brazil.

8. *Philine* cf. *infundibulum* Dall, 1889

Reference.—Marcus, 1967b: 606-607, figs. 18-22.

Material.—Brazil: 3°08'05"N, 48°07'W, 85 m; one specimen.

Further Distribution.—W. Colombia, 10°17'N, 75°59'09"W, 724-597 m.

Remarks.—One young *Philine*, 9 mm long and 4 mm broad, has the gizzard plates characteristic of *Ph. infundibulum*. The radula corresponds to that described by us for *Ph. cf. infundibulum*; the radula of Dall's species is not known. That species was taken at Bermuda, in the Straits of Florida, and among the Antilles, as far south as Barbados, in 216-680 m.

The species is now recorded for the first time from Brazil.

9. *Micromelo undata* (Bruguère, 1792)

References.—Marche-Marchad, 1956: 58; 1958: 39; Marcus, 1967a: 12-15, pl. 1, fig. 6, text figs. 7A-7F.

Material.—Brazil: Recife, Praia da Piedade; one specimen with shell 9.6 mm long, 6.5 mm wide, and 5.2 mm high.

Further Distribution.—Florida and Keys; Bermudas; Antilles from Cuba and Puerto Rico to Grenada, Bonaire, and Curaçao; Brazil, Pernambuco, Alagoas; Cape Verde Islands; ? Sénégal.

Remarks.—The paper of Rochebrune (1881), cited by Marche-Marchad (1956), in which *Micromelo nitidula* (Lister, 1685), probably a synonym of *undata*, is mentioned from Sénégal, is not available to me.

10. *Cylindrobulla beau* P. Fischer, 1856

Reference.—Marcus, 1970b: 22, figs. 27-32.

Material.—Brazil: from 3°58'S to 9°37'S and 35°15'40"W to 35°56'W, 33-70 m, on calcareous algae with sponges; 4 specimens.

Further Distribution.—Florida, Biscayne Bay; Puerto Rico; Virgin Islands; Guadeloupe; Curaçao.

Remark.—The species is new for Brazil.

ON THE WEST ATLANTIC SPECIES OF *Atys*

The differences of the shells in one and the same species of *Atys* were figured for *A. cylindricus* by Pilsbry (1895: pl. 33, figs. 60-64). The present material also has very different shells whose sculpture, moreover, appears different according to the angle and intensity of light. Apart from *A. m'andrewii* with opaque spiral bands in the shell, the anatomical features

furnish safer characters for the distinction of the species. The jaw plates and the gizzard plates, and sometimes the penis, were described for a few species by Bergh (1901: 259-260, pl. 20; 1902: pl. 28; 1908: 156, pl. 19), Vayssi re (1906: 27-35, figs. 14-16, 18), and Marcus (1960: 881-882, figs. 7-13).

Of the soft parts, the Hancock's organ might be useful and certainly the male copulatory organ is, though the descriptions and figures given by Bergh (1901: pl. 20, fig. 12) and Vayssi re (1906: fig. 20) for *A. cylindricus* are divergent. Possibly in Vayssi re's specimen the caecum adhered to the duct of the seminal vesicle.

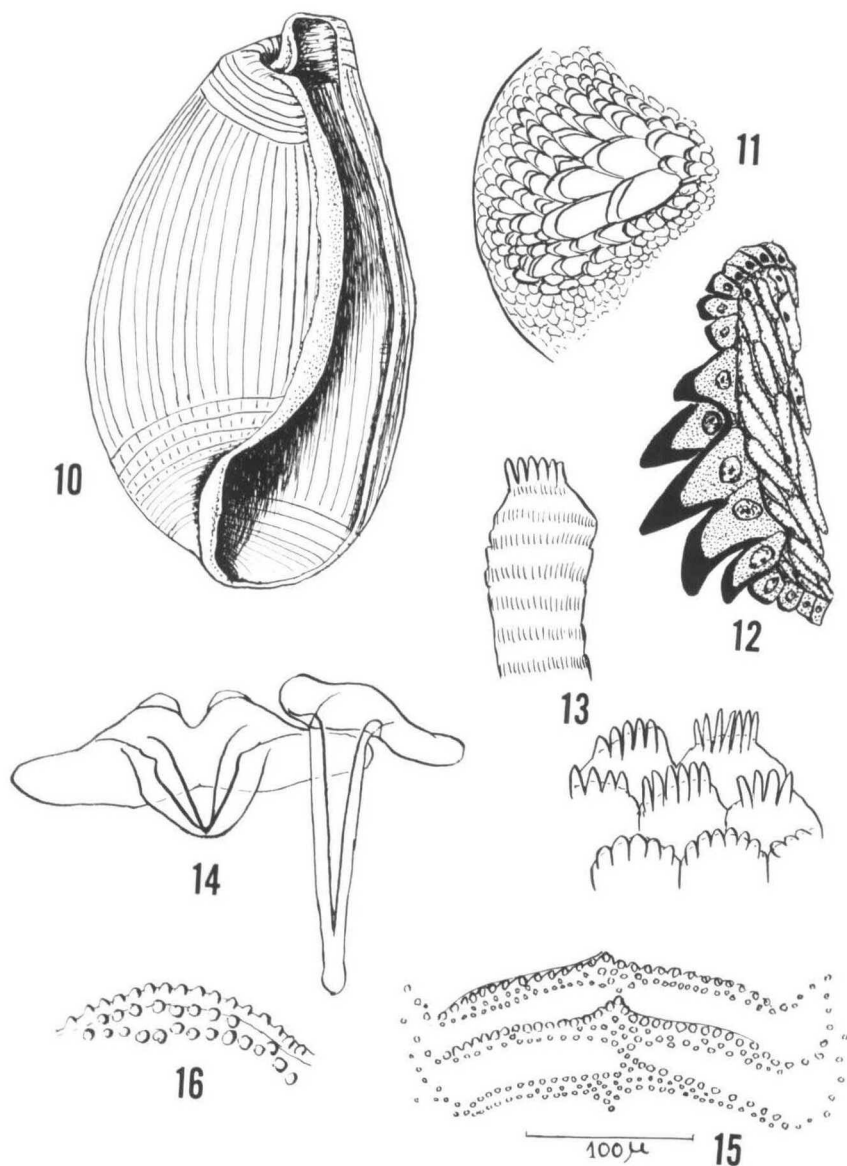
The most frequent of our shell types I call *riiseanus* M rch, 1875, *sensu* Abbott (1958: 99-100), though it is not clearly distinct from *guldingi* Sowerby, 1869. It is barrel-shaped, fragile, flattened near the top, and with a high outer lip (Fig. 10). It has about 12 spiral lines on either end, which stop suddenly, and whose interspaces become wider towards the middle. The axial growth lines are often distinct ribs, sometimes extending between the spiral lines forming a gridwork, sometimes ending at the beginning of the spirals. Complete absence of the axial sculpture and fine spiral lines all over the shell are also found.

Relatively frequent is the second type, *Atys caribaeus* d'Orbigny, 1841, which shows a combination of a slender, rather solid shell with close spiral lines at both roundish ends, gradually becoming finer towards the middle, and irregular growth lines (Fig. 19).

An unquestionable species is *Atys m'andrewii* E. A. Smith, 1872. The slender, roundish shells have no axial sculpture and only terminal spiral furrows (Fig. 25). The middle of the body whorl bears one broad opaque spiral band and a number of fine ones in front of and behind it.

The presence or absence of spiral lines, more or less deep narrow grooves, is difficult to distinguish. This statement is rather subjective in doubtful cases; microscopic lines, visible with bright illumination under high power, occur often in shells otherwise shaped as typical *riiseanus*.

In many lots, shells of the different types were mixed, and my effort to separate them after criteria of the shell was in vain. I often transferred an individual shell from one label to the other and back. Neither size, nor thickness or thinness of shell, nor proportion of length to width, nor flattened or convex spire, nor the degree of the outer lip overtopping the apex, nor the presence or absence of spiral lines in the middle, nor distinct or wanting axial growth lines, nor the greatest width above or below the middle, nor the presence of a columellar fold emerged as clear-cut specific differences, as the descriptions by Pilsbry (1895), Abbott (1955), and Warmke & Abbott (1961) indicate. I did not find specimens as roundish as *A. sandersoni* Dall, 1881 (Abbott, 1954: 278, fig. 59d) mentioned from Brazil (Dall, 1889: 54).



FIGURES 10-16.—*Atya riiseanus* Mörch: 10, shell; 11, labial plate; 12, section of same; 13, rodlets of jaw plate; 14, radular teeth; 15, ribs in middle of gizzard plate; 16, rib near end of same.

The descriptions of Usticke (1959: 85) seem to be based upon very few shells, so that he could not judge the variability of the proportions of width to length. He separated "form *corpulenta*" (65 per cent) from *caribaea* (54.5 per cent). His *caribaea* is that of Pilsbry, hence *riiseanus* of Abbott's and the present concept, with a proportion of 52.9 to 67 per cent, which includes Usticke's forms. *Atys sharpi* was recognized as a synonym of *caribaeus* (not Pilsbry) by Abbott (1958: 100).

The few present preserved animals luckily belong to three well-defined types, not to intermediate ones: about 10 to *riiseanus*, three to *caribaeus*, and one to *m'andrewii*. They differ clearly by jaw plates, gizzard plates, and male organs.

Already Bergh (1901: 259, 260-261, pl. 20) had stressed the different jaw plates and male organs of *A. cylindricus* and *A. naucum*. The gizzard plates and the male copulatory organ were described for *A. naucum* and *A. cylindricus* by Bergh (1901; 1902) and Vayssi re (1906), and for *A. xarifae* (Marcus, 1960: 881) and *Atys* spec., juv. (in press). The gizzard plates furnish specific characters: they are of different size in *A. xarifae*, have fine transverse lines in *A. naucum*, coarse ribs united in a median crest in *A. cylindricus*, are ribbed and granulate in *riiseanus* (Fig. 15), and the ribs of those of *caribaeus* and *m'andrewii* bear a single row of spines. Also the male organ is specific.

11. *Atys riiseanus* M rch, 1875

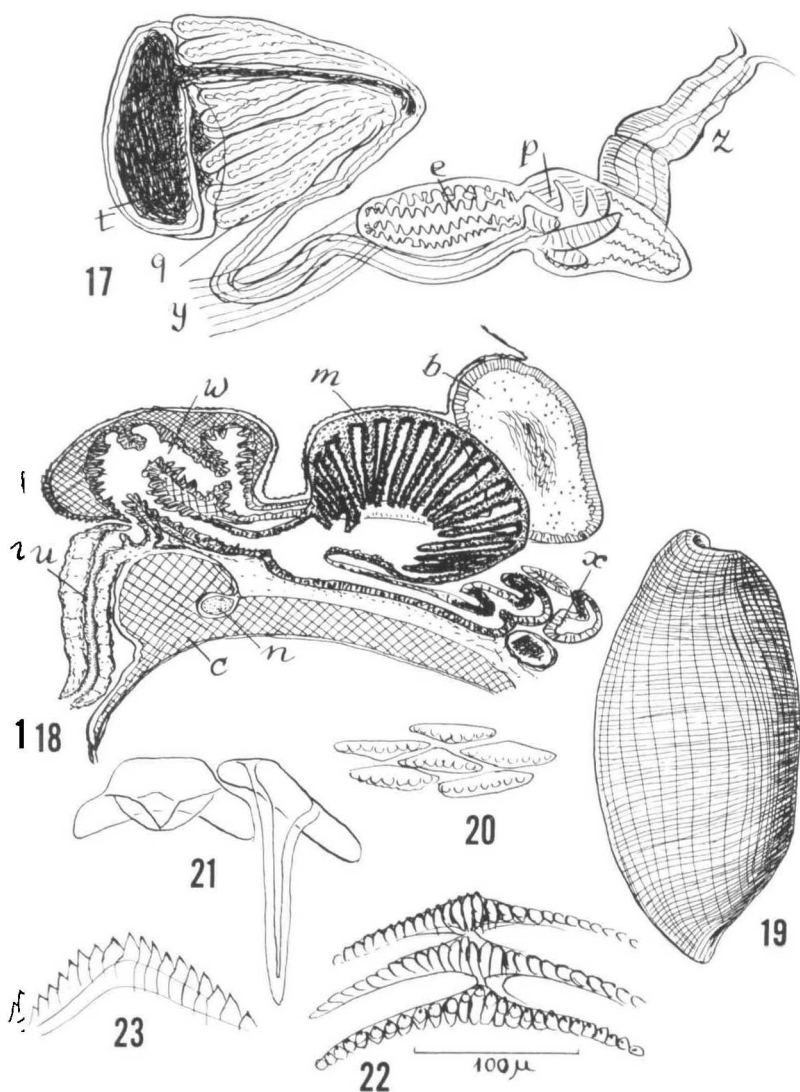
Figs. 10-18

References.—Pilsbry, 1895: 274, pl. 48, fig. 12a (*caribaea*, part.); Abbott, 1955: 278, fig. 59c (*caribaea*); 1958: 99 (synonymy); Warmke & Abbott, 1961: 142, pl. 27i (*riiseana*); Jong & Kristensen, 1965: 48 (*riiseana*).

Material.—Brazil: 00°03'N to 11°19'40"S and 32°28'01"W to 45°00'05"W, in depths from 16-90 m, on various substrates—clumps of and free calcareous algae, *Halimeda*, sand, detritus, and mud; about 200 empty, partly broken shells, and 10 preserved snails.

Further Distribution.—Florida; Bahamas; Cuba; Grand Cayman; Puerto Rico; Guadeloupe Island; Cura ao.

Description.—The shining, cream to transparent white shells (Fig. 10) measure from 4 to 13 mm. Their breadth varies from 52.9 to 67 per cent of the length. The ratio of diameter to height is 1:1.5 to 1.88, quite different widths occurring in one and the same lot. The shells are widest in the middle, narrowing to both ends, often more compressed behind, and have a high outer lip. They are rather fragile. The sculpture consists of distinct spiral lines on both ends, whose number as well as distance from one another is variable and not correlated with stout or slender shells. In many specimens



FIGURES 17-23.—17-18, *Atys riiseanus* Mörch: 17, male organ; 18, section of inner reproductive organs.—19-23, *Atys caribaeus* d'Orbigny: 19, shell; 20, elements of jaw plate; 21, radular teeth; 22, ribs near middle of gizzard plate; 23, rib near end of gizzard plate. (*b*, bursa seminalis; *c*, columellar muscle; *e*, caecum; *m*, mucus gland; *n*, nerve; *p*, penis; *q*, prostate; *t*, seminal vesicle; *u*, seminal groove; *w*, gonoduct; *x*, albumen gland; *y*, retractor; *z*, male atrium.)

of both types there are microscopical spiral lines also in the middle of the shell. Axial growth lines are most distinct in the middle, and are sometimes fine ribs; in other shells, there may be extremely fine lines or none at all. In a few specimens the periostracum is orange brown.

There are one and a half calcified whorls maintained; the innermost are dissolved and only their cuticular part, thrown into longitudinal folds, remains. The aperture is longer than the axis of the shell. The slightly reflexed outer lip rises to the left around the sunken spire. A callus covers the latter and the inner lip and ends at the reflexed columella, which hides the umbilical chink. In most shells the columella is straight, but in several snails it bears a slight fold. As shells with different sculpture occur together and intergrade, I cannot divide them into different species, e.g., *A. riiseanus* and *A. guildingi* (Pilsbry, 1895: 274, 275).

The preserved snails are dirty white, often with a red or brown pattern on the outer side of the mantle which shines through the shell, as do the big eyes and the dark gizzard plates. The cephalic shield is notched in front and ends with two pointed flaps. The parapodia are thick and rather small, perhaps due to contraction; the foot does not stand out behind them with its almost transverse hind border. The infrapallial lobe is well developed. The Hancock's organs are simple, undulate bulges. Between the head shield and the foot there are two fleshy transverse lips to the sides of the mouth opening.

In a 13-mm snail, the jaw plates measure 0.5 by 0.18 mm. They are composed of polygonal columns of about 26μ diameter and up to 60μ in height (Fig. 13), bearing 3-7 denticles at the end. In front of the jaw plates there are two further labial plates, 200μ long and 250μ broad (Fig. 11), consisting of hollow cones of different sizes, up to 80μ long, with median points (Fig. 12).

The radula (Fig. 14) is 1.00 by 0.4 mm. The formula is $40 \times 13.1.13$. The rhachidian tooth has a projecting median cusp. The laterals are knobbed at the tip; the longest has a cusp 80μ long.

The three gizzard plates are of equal size, 1.27 by 0.87 mm in a 13-mm specimen, and have about 50 dark ribs, confluent in the median crest (Fig. 15) and covered with pointed granules, about 60 on the sharp edge, 5μ in diameter, and smaller ones on the surface (Fig. 16). The three plates are united by a uniform ring of shining musculature. The digestive gland is brown, olive, or orange. The ovotestis is mingled with it. The intestine contains spicules and calcareous material of corals, algae, and some nematodes among amorphous masses.

The sperмовiduct leaves the ovotestis, whose follicles are mingled with the lobes of the digestive gland. In its forward course it is distended by sperm, serving as an ampulla. The next part is a glandular loop directed backwards, the albumen gland (Fig. 18, *x*), which opens into a wide muscular portion of the pallial gonoduct (*w*) together with the mucus gland

(*m*). The epithelium of the latter is thrown into psalterium-like folds. From the outermost muscular part of the genital duct a long tube turns to the left and ends in a wide bursa seminalis (*b*). All parts of the pallial gonoduct stand out singly into the mantle cavity, though they are covered by a thin layer of the cavity floor in a similar way to that figured by Perrier & Fischer (1911: pl. 2, fig. 1, G) for *Aplustrum*.

The seminal groove (*u*) is a deep furrow which runs from the gonopore around the hind end of the right Hancock's organ and enters the male atrium under the fore end of the latter. The male atrium (*z*) has a folded epithelium and a thick layer of circular muscles. Its widened inner end contains irregular muscular thickenings (*p*) corresponding to the conical penial glands of *A. cylindricus* (Bergh, 1901: 259, pl. 20, fig. 12). Entally the lumen of the atrium is divided in two, a caecum (*e*), Bergh's "Blindsack" with deeply folded epithelium, and a narrow tube leading to a prostate consisting of many glandular tubes (*q*), and a wide, sperm-lodging vesicle (*t*). On the end of the caecum a strong bundle of retractor muscles (*y*) is inserted, through which passes a loop of the duct to the sperm pouch.

Remark.—The species is reported for the first time from Brazil.

12. *Atys caribaeus* d'Orbigny, 1841

Figs. 19-24

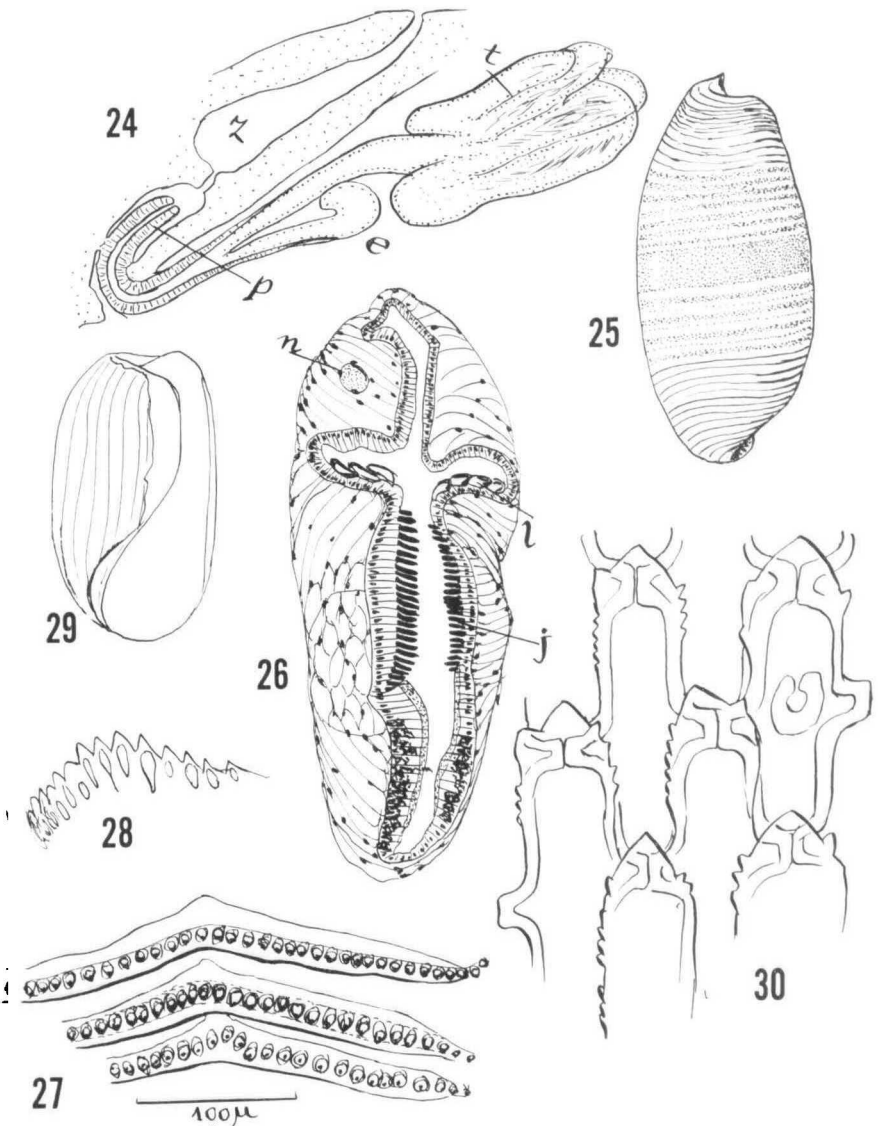
Synonyms.—? *A. canariensis* E. A. Smith, 1872: 346; Pilsbry, 1895: 274. *A. sharpi* Vanatta, 1901: 183; Usticke, 1959: 85.

References.—Pilsbry, 1895: 274, pl. 28, figs. 33, 34 (*caribaea*), not pl. 48, fig. 12a (is *riiseanus*); Abbott, 1958: 100 (synonymy); Warmke & Abbott, 1961: 143, pl. 27q (*caribaea*).

Material.—Brazil: among the shells of *A. riiseanus* some 20 were recognized as *caribaeus*. From 2°10'05"S and 41°27'W, three animals.

Further Distribution.—North Carolina; southeastern Florida; Lesser Antilles, 27-183 m; ? Tenerife (*canariensis*).

Description.—The glossy, transparent white shells (Fig. 19) reach 9 mm in length and 4.4 mm in diameter. The ratio of diameter to length is 1.73 to 2.14; the percentage of width to length is 46.7 to 57.2 per cent. The greatest width lies generally in front of the middle. At both ends the shell narrows in a convex curve. It bears close-set spiral lines all over, most distinct at the ends, microscopical in the middle, and irregular axial growth lines. There is a thin, colorless periostracum. A callus on the inner lip continues onto the reflexed columella which bears a little fold near its curving to the outer lip. The umbilicus is rather deep. The outer lip rises in an even curve over the



FIGURES 24-30.—24, *Atys caribaeus* d'Orbigny, male copulatory organ.—25-28, *Atys m'andrewii* E. A. Smith: 25, shell; 26, section of buccal cavity; 27, ribs near middle of gizzard plate; 28, rib near end of same.—29, *Haminoea petiti* (d'Orbigny), shell.—30, *Oscanius* (?) *testudinarius* (Cantraine), elements of jaw plate. (e, caecum; j, jaw plate; l, labial cuticular spines; n, nerve; p, penis; t, seminal vesicle; z, male atrium.)

apex. Sometimes it is thickened, as in the Columbellidae (Marcus, 1962: 347).

The preserved snails are brownish; the dark eyes are visible. The parapodia are thin flaps. The labial platelets found in *riiseanus* (Figs. 11, 12) occur also in the present species. They are about 20μ long. The jaw plates measure 150μ by 100μ ; their elements (Fig. 20) are flat columns, 6μ high and 10μ by 2.5μ on the surface, which shows traces of denticulation. The radula has 35 rows of 9-10.1.9-10 teeth (Fig. 21). The three gizzard plates are of equal size, 650μ by 400μ , with 30-35 brown ribs, each of which bears a single row of spines about 6μ in diameter (Figs. 22, 23).

The male organ (Fig. 24) differs considerably from that of *A. riiseanus*. The thin-walled male atrium (*z*) is embedded in the muscular layer of the body wall. Farther inwards the male duct pierces a small, muscular penial papilla (*p*). Entally it is divided into a small, smooth caecum (*e*) and a mighty, sperm-lodging vesicle (*r*). The few sperms of the latter's contents are mixed with pink-staining secretion, probably produced by the high epithelium of the vesicle, which is thrown into about six longitudinal folds.

Remark.—The species is new for Brazil.

13. *Atys m'andrewii* E. A. Smith, 1872

Figs. 25-28

Synonym.—*Atys lineata* Usticke, 1959: 85.

References.—Pilsbry, 1895: 273 (*A. m'andrewii*); Odhner, 1932: 24, pl. 1, fig. 20 (*A. [Alicula] macandrewii*); Usticke, 1959: 85 (*A. lineata*); Warmke & Abbott, 1961: 143, pl. 27, j (*A. lineata*); Jong & Kristensen, 1965: 48 (*A. lineata*).

Material.—Brazil: from $01^{\circ}12'S$ to $10^{\circ}21'S$ and $35^{\circ}29'40''W$ to $44^{\circ}40'W$; 27-55 m; 8 empty shells and one preserved animal.

Further Distribution.—Caribbean Sea and Curaçao; Canaries, La Luz, Lanzarote.

Description.—The pretty shells measure from 5.2 by 2.8 to 7.3 by 3.6 mm. The ratio of width to length is 1:1.85 to 2.3; the percentage of width to length, 43.4 to 54.1 per cent. The greatest width is in front of the middle. They are transparent with opaque white spiral bands, generally a broad one near the middle and narrow ones forwards and backwards toward the ends, alternating with 7 to 20 spiral furrows.

One and a half whorls are calcified, the rest are dissolved. Between the rising and descending part of the outer lip there is a distinct angle. The inner lip is covered by a thin callus, and the columella is slightly reflexed

over a more or less depressed umbilical chink. There are only traces of growth lines.

The black eyes, the dark gizzard plates, and the greenish digestive gland shine through the shell.

The only preserved snail was sectioned after taking out the gizzard plates. The cuticular spiny cones on the labial plates (Fig. 26, *l*) are smaller than those in *A. riiseanus*. The largest of them measure 6μ by 19μ . The cylindrical elements of the jaw plates (*j*) are 13μ high and 4μ in diameter. The radula was not analyzed. The brown gizzard plates measure 590μ by 290μ and have 25 crests (Fig. 27) with a single row of spines, each containing a refractive body (Fig. 28).

The male organ was partly evaginated, hence not suitable for a comparison with the other species. It consists of a muscular papilla and entally a bipartite duct, opening into two vesicles, the shorter of which has a glandular epithelium and corresponds to the caecum; the longer stores sperm.

Remark.—The species is new for Brazil.

14. *Haminoea petiti* (d'Orbigny, 1842)

Fig. 29

References.—Abbott, 1958: 100; Warmke & Abbott, 1961: 142, pl. 27p; Jong & Kristensen, 1965: 8.

Material.—Brazil: $02^{\circ}31'S$, $40^{\circ}22'W$, 23 m; one empty shell, 11.5 mm long, 7 mm in diameter.

Further Distribution.—Florida; Grand Cayman; Puerto Rico; Curaçao.

Remarks.—The present shell differs from that of *H. elegans* (Gray) by the absence of the spiral lines, the distinguishing feature mentioned by Abbott.

This is the first record for Brazil.

15. *Akera bayeri* Marcus, 1967

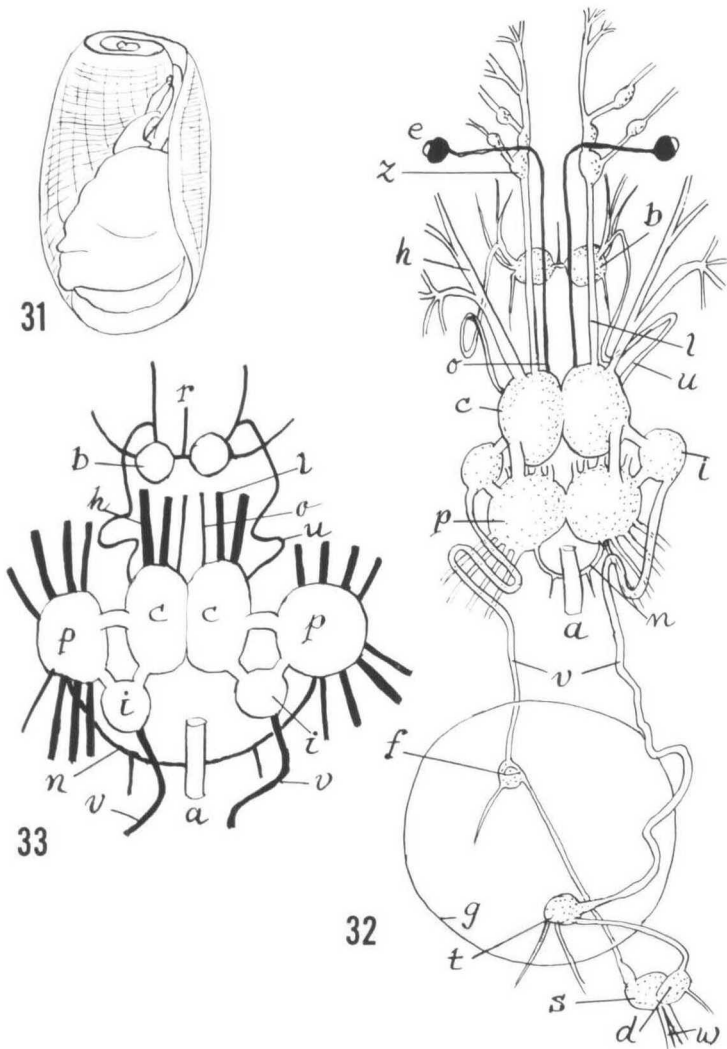
Figs. 31-33

Reference.—Marcus, 1967b: 610-613, figs. 29-38.

Material.—Brazil: from $2^{\circ}10'05''S$ to $9^{\circ}01'15''S$ and $34^{\circ}50'20''W$ to $41^{\circ}27'W$, 35-40 m; 12 preserved animals.

Further Distribution.—Southwestern Caribbean Sea, 87 m.

Descriptive Notes.—The present shells measure from 5 by 3 to 12 by 6.6 mm. The most extended animal was 17 mm long. One of the snails was completely retracted into its shell (Fig. 31). The height of the spire varies in degree. The anatomy is consistent with that of our previous description,



FIGURES 31-33.—*Akera bayeri* Marcus: 31, animal retracted into shell; 32, nervous system, diagram; 33, nervous system laid open by cutting pedal commissure to show natural position of commissures. (a, aorta; b, buccal ganglion; c, cerebral ganglion; d, abdominal ganglion; e, eye; f, left parietal ganglion; g, gizzard; h, nerve to Hancock's organ; i, pleural ganglion; l, labial nerve; n, parapedal commissure; o, optic nerve; p, pedal ganglion; r, radular nerve; s, subintestinal ganglion; t, suprainestinal ganglion; u, buccal nerve; v, visceral loop; w, genital nerve; z, accessory ganglion.)

and with those of *A. bullata* Müller and *A. soluta* Gmelin given by Perrier & Fischer (1911: 127, ff.). There are big Blochmann's glands in the mantle border, and long, tubular opaline glands open separately behind and under the genital aperture. The cloacal tentacle is up to 7 mm long and covered with sensory papillae. The pallial caecum is not longer than the body whorl. The alimentary canal corresponds to Bergh's descriptions for *A. bullata* (1900: 173) and *A. soluta* (1901: 311). The radula comprises 33-35 rows of 27.1.27 teeth. There are three sets of gizzard teeth, and a "third stomach" (Bergh) with many spine-shaped ones. The number of spiny warts in the male atrium is from 6-9.

Hoffmann (1936: 663-668) surveyed the knowledge of the nervous system of *Akera bullata*, based upon the studies by Ihering (1877), Pelseneer (1894), Lacaze-Duthiers (1898), Guiart (1901), and Vayssi re (1903). As *Akera bayeri* differs in some details from *A. bullata*, and some questions had remained doubtful, I have dissected several of the present specimens to compare the nervous system with the description by Hoffmann. The nerve ring (Figs. 32, 33) is shorter than in *bullata*, the cerebral ganglia (*c*) are oblong and closely apposed to one another for over half their length. The round pedal ganglia (*p*) are separated only by a quite short commissure. The longest connectives are the cerebro-pedal ones, about half as long as the breadth of one cerebral ganglion. The cerebro-pleural and the pleuro-pedal connectives are shorter. There is a thin parapedal commissure (*n*) under the aorta (*a*) with two nerves originating from it. From either cerebral ganglion arise four forward nerves. The innermost rather thin optical nerve crosses over the two following lateral ones far in front to insert on the eye (*e*). The second, strong labial nerve (*l*) runs to the level of the eye, where it bears an accessory ganglion (*z*) and gives off two lateral branches, each with a smaller ganglion. All fibers coming forth go to the lips. The third, strong nerve (*h*) divides shortly after leaving the cerebral ganglion and innervates the Hancock's organ. The fourth, thin nerve goes out from the under side of the cerebral ganglion and loops to the buccal ganglion (*b*), which it does not enter directly. It unites with a nerve going forward from the buccal ganglion. From the pedal ganglion (*p*), about four trunks go forward and four backward.

The pleural ganglia (*i*) are undivided and of equal size. The visceral loop (*v*) is cephalaspidean. It corresponds to that of *Haminoea* (Guiart, 1901: 129, fig. 76), except for the more distinct torsion in *Akera bayeri*. The short nerve ring is more like that of Guiart's diagram of *Haminoea* than that of his diagram of *Akera* and that of Vayssi re for *Akera* (1903: pl. 2, fig. 18). The left parietal ganglion (*f*) is between the left pleural and the subintestinal one (*s*). The right one seems to be represented only by a few small ganglionic cells around the entrance of the pallial cord into the suprainintestinal ganglion (*t*). The latter gives off the osphradial and a second nerve. The

following ganglion differs from the descriptions. As in *Bulla* and in *Hami-noea hydatis* (Hoffmann, 1932-40, figs. 480B, 481A), it consists of a small right part, the abdominal ganglion (*d*), and a larger left part, the subintestinal ganglion (*s*). Which of these lodges the genital ganglion was not decided, as the genital nerve (*w*) leaves the limit between the swellings of the ganglion.

Discussion.—As briefly mentioned previously (Marcus 1967b: 613), we would place *Akera* among the Cephalaspidea, following Perrier & Fischer (1911: 179), Thiele (1931: 389; 1935: 1097), Hoffmann (1932-1940), and Wirz (1952: 167), but against the opinion of Boettger (1955: 256, 266, 272), Morton & Holme (1955: 109), Zilch (1959: 55), Beeman (1968: 89), and others. *Akera* certainly links the Cephalaspidea to the Anaspidea, but several of its characters are exclusively cephalaspidean, e.g., the head shield, the Hancock's organ (Hoffmann, 1935: 603), the parapodia continuous with the sole of the foot (Morton & Holme, 1955: 109), the infrapallial lobe, and the pallial caecum with its ciliated bands. The similarity of the radula and the alimentary tract with that of the Anaspidea (Hurst, 1965: 345) may perhaps be explained by the identical method of feeding. An opaline gland occurs also in Cephalaspidea, e.g., *Toledonia* (Odhner, 1926, fig. 11, p), the Runcinidae (Odhner, 1924: 50).

Remark.—The species is new for Brazil.

NOTASPIDEA

16. *Umbraculum plicatulum* (v. Martens, 1881)

References.—Marcus, 1967a: 42, fig. 51; 1967b: 613, figs. 39-41.

Material.—Brazil: from 4°13'05"S to 10°43'03"S and 34°26'W to 50°26'W, 50-85 m, 19 empty shells from 5 by 3.9 mm to 30 by 25 mm. All borders are damaged, so that the measurements are not exact.

Further Distribution.—Dry Tortugas; Florida; Cuba; western Caribbean.

Remark.—The species is new for Brazil.

17. *Oscanius* (?) *testudinarius* (Cantraine, 1840)

Fig. 30

References.—Pilsbry, 1896: 213, 214 (*O. tuberculatus*), pl. 50, figs. 43-46; Bergh, 1897: 81-89 (*O. testudinarius*), pl. 5, figs. 19-26, pl. 6, figs. 1-10, pl. 12, figs. 36-39; Vayssi re, 1898: 360-370 (*Pleurobranchus* [*Susania*] *testudinaria*), pl. 15, fig. 23, pl. 22, fig. 121, pl. 23, figs. 135-144, pl. 24, figs. 145-147; Pruvot-Fol, 1954: 222 (*O. testudinarius*), fig. 85.

Material.—Brazil: off Maranh o, 2°05'S, 42°44'W, 46 m; 1 specimen.

Further Distribution.—Western Mediterranean Sea.

Descriptive Notes.—The specimen is 65 mm long and broad, but incomplete; the hind end of the notum and of the foot are missing. The height is 40 mm. The color is dark reddish brown, with light spots on the dorsal tubercles. The sutures between the tubercles which give the notum of the species the aspect of a tortoise (Bergh, 1897: 43; Vayssi re, 1898: pl. 15, fig. 3), are indistinct, as in Pruvot-Fol's figure. The radiate spicules agree with Vayssi re's figures; Bergh (p. 84) did not find any spicules in this species. The spicules of the notum are bigger than those in the back of the foot. Also those of the veil are small, and those of the under side of the mantle minute. The sole does not contain any spicules. The mantle is much broader than the foot, the anterior border of which is bilabiate. The broad veil with furrowed sides (frontal tentacles), the rolled rhinophores, and the nodose rhachis of the gill, also provided with small radiate spicules, are as previously described for *O. testudinarius*. Also the big lobes around the genital apertures and the penis projecting between them agree with Vayssi re's figure (fig. 121). The surface of the central nervous system is smooth, not warty as in *O. membranaceus* (Montagu, 1811).

There are only vestiges of the reddish shell, the cavity of which is ample, as Vayssi re described it (p. 368); Bergh found the shell cavity small. Macnae (1962: 175) described a species, the shell of which is absent in some specimens, present in others.

The jaw plates are 12 mm long and 7 mm broad. The denticles of the platelets (Fig. 30) are very variable, according to their position in the mandible. As in Bergh's material (p. 85) they show signs of wear. The number of denticles corresponds to Bergh's (pl. 5, fig. 23), not to Vayssi re's figures (pl. 23, figs. 137, 138). The radula is 10 mm long, 12 mm broad. It contains about 120 rows and 240 smooth teeth per half-row.

Remarks.—The animal is damaged and its shell is dissolved, so that the identification is not absolutely sure. It is certainly not identical with any other Atlantic pleurobranch, including *Pleurobranchopsis aurantiaca* Verrill (1900: 547, pl. 66, fig. 5) from the Bermudas. Thiele (1931: 419) considered *Pleurobranchopsis* as a subgenus of *Pleurobranchus* and changed the specific name, because *Berthella aurantiaca* (Risso) was described as *Pleurobranchus aurantiacus* Risso, 1818.

The species is new for Brazil.

DORIDOIDEA

18. *Chromodoris kempfi*, spec. nov.

Figs. 34-38

Material.—Brazil: 2 22'00"S, 41 51'05"W, 30. X. 1967, 37 m, 2 specimens.

Description.—The two preserved slugs measure 10 and 12 mm; their breadth is 4 and 4.5 mm, the height 3 and 3.5 mm, the width of the sole 1.5 and 2 mm, respectively.

The color of the living slugs, described and sketched by Dr. Kempf (Figs. 34, 35), is blue with an orange border and a white midline. Around the border, between the orange and the blue, is a band of seven darker blue and seven white spots on either side. The light blue hyponotum is set off from the orange rim by a dark blue stripe, and the sole is dark blue. The rhinophores and the gills are blue. In the preserved state all traces of color have faded out.

The pointed tentacles are grooved on the outer side (Fig. 36). The rhinophores bear 12 leaflets. There are 9 unipinnate gills. The borders of the rhinophoral and branchial pits are smooth. The bilabiate anterior border of the foot has distinct corners, no notch. The tail is as long as the notum (Fig. 35).

The labial grasping ring is almost complete. It is 400μ in diameter, 170μ in breadth, and consists of quincuncial plates, about 15μ in diameter (Fig. 37). Each of these bears 2-5 spines, most frequently 3-4.

The radula is very small, 750μ by 380μ , and has 50 rows of 35 teeth per half-row. The rhachis is naked. The teeth (Fig. 38) are about 40μ in length and have 3-8 denticles.

Discussion.—The shape of the labial platelets is rather uncommon in *Chromodoris*. None of the blue species shows it, as far as their labial elements were described. For the Pacific *Chromodoris gloriosa* Bergh, 1874, Pruvot-Fol (1951: 107) mentions "écailles denticulées," and for the Mediterranean "*Doris krohnii*" Verany, 1846, "écailles dentées" (p. 114), but both have quite different colors.

The species is named for the collector, Dr. Marc Kempf.

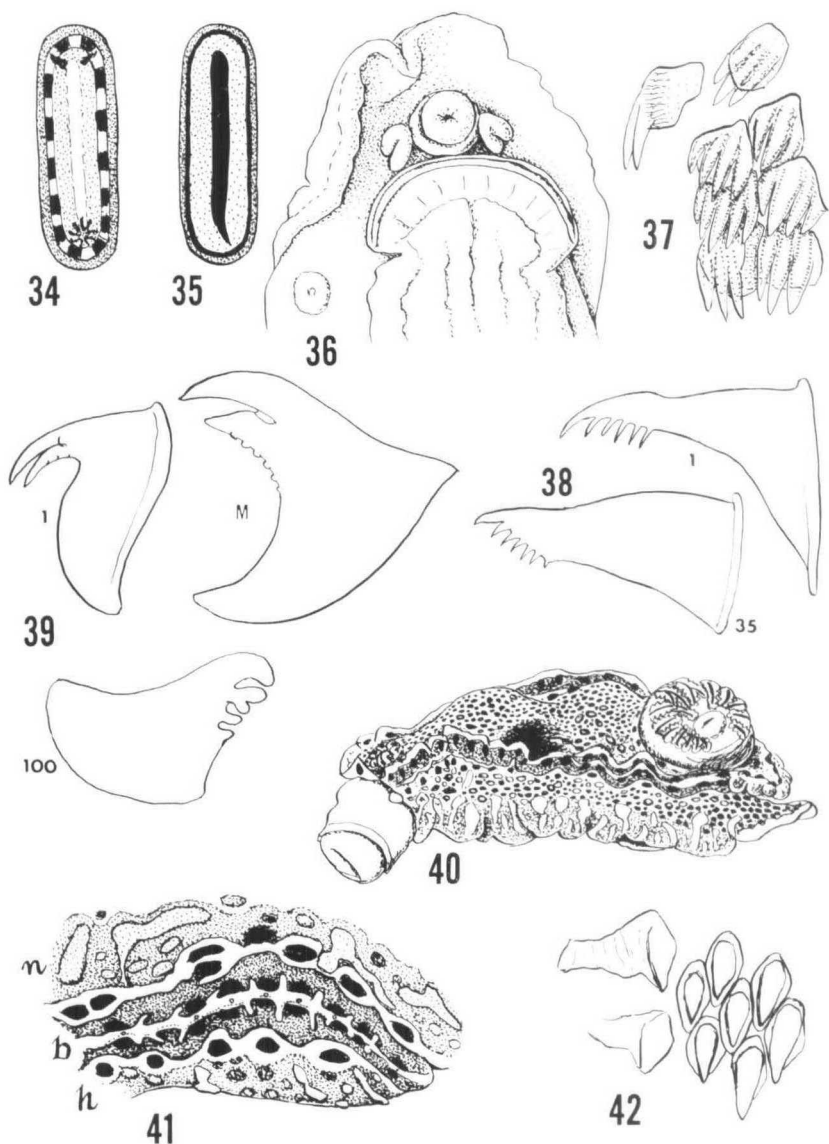
19. *Hypselodoris marci*, spec. nov.

Figs. 39-42

Material.—Brazil: $4^{\circ}46'00''S$, $35^{\circ}24'05''W$, 16. X. 1967, one specimen. Caribbean, off Venezuela, R/V PILLSBURY Station 746, $11^{\circ}57'09''N$, $66^{\circ}50'W$, 23-27 m, 24. VII. 1968, dredged with many gorgonids, a color slide of the living animal.

Description.—The preserved Brazilian animal (Fig. 40) is 22 mm long, 4 mm broad, and 4.5 mm high. The buccal mass and the branchial region are everted. The size of the Venezuelan specimen is not indicated.

The colors of the preserved slug agree perfectly with those of the slide; blue and black and white are well preserved. The slide shows a red line along the notal brim, and the gills are red to the sides of the dark blue



FIGURES 34-42.—34-38, *Chromodoris kempfi*, spec. nov.: 34, 35, dorsal and ventral sides, respectively, of living slug, from sketches by Dr. Kempf; 36, head of preserved slug; 37, jaw elements; 38, radular teeth.—39-42, *Hypselodoris marci*, spec. nov.: 39, radular teeth; 40, preserved slug; 41, notal brim; 42 jaw elements. (*b*, brim; *h*, hyponotum; *n*, notum.)

rhachis. Dorsally and ventrally to the red brim (*b*) there are big blackish blue spots corresponding to the subnotal glands, whose apertures are seen in the red streak. Dividing the areas of the glands from one another and from the notum is a white band. Towards the middle, the white pigment is interrupted by two dark blotches. In the middle of the back, the white pigment leaves small areas free around the blue notal glands. These stipples are often eye spots with a light blue center. Along the sides of the notum there are larger light blue flecks. The hyponotum (*h*) has the same elements, and a number of transverse white streaks go to the border of the foot, yellowish in the slide. The sole is whitish.

The blunt tentacles are hidden under the extruded buccal mass. The rhinophores have blue tips and about 20 foliations. Their pits are surrounded by 8-10 blue lobes with white margins. There are 15 unipinnate gills, four of which are branched near the tip. The white anterior border of the foot is bilabiate; the pointed and stippled tail stands out over the notum.

The yellow labial rodlets (Fig. 42) have the hook shape typical of *Hypselodoris*, but no accessory points. Their shaft is stratified. The light blue radula measures 2.5 by 2.2 mm and has 60 rows with up to 105 teeth per half-row (Fig. 39). The rhachis is naked. All teeth are bicuspid, and most of them, at least the lateral $\frac{2}{3}$, have denticles on the under edge, more developed near the border of the radula. Those near the rhachis measure 50 μ ; in the middle of the half-row they have a base 100 μ long, and a cusp 75 μ long.

Discussion.—The present species is nearest to *Hypselodoris acriba* Marcus (1967a: 60). It differs by a blue line on the rhachis of the gills against a red one in *acriba*, and by the denticles of the radular teeth being more numerous in *marci*. *H. clenchi* Russell, 1935 (Pruvot-Fol, 1951: 53) from Bermuda has red rhachis lines as *H. acriba*. For *Chromodoris roseo-picta* Verrill, 1900 (Pruvot-Fol, 1951: 140), whose colors as described are similar to the present ones, the rhachis of the gills is not indicated.

20. *Rostanga byga* Marcus, 1958

Reference.—Marcus, 1958b: 22-25, figs. 34-36.

Material.—Brazil: 2°04'S, 40°13'W, 65 m, one specimen.

Further Distribution.—Brazil: São Paulo.

Remark.—This is the second specimen of the species. It confirms the characters of the first.

21. *Thordisa diuda* Marcus, 1955

Reference.—Marcus, 1955: 140-143, figs. 133-140.

Material.—Brazil: 6°04'07"S, 34°30'W, 51 m.

Further Distribution.—Brazil: Island of São Sebastião.

Remarks.—The specimen is 9.5 mm long and 5.4 mm broad; it bears scattered melanophores in the notum and six orange gills. The radular formula is $30 \times 4-7.24.0.24.4-7$. The reproductive organs were not investigated.

22. *Discodoris evelinae* Marcus, 1955

Fig. 43

Synonym.—*Discodoris hedgpethi* Marcus, 1959: 254.

References.—Marcus, 1955: 143; 1967a: 75 (*evelinae*, *hedgpethi*); 1969a: 13 (*evelinae*); 1970b: 62, figs. 111-114 (*hedgpethi*).

Material.—Brazil: Pernambuco, Suape, littoral, under stones; three specimens from 18 to 35 mm, preserved.

Further Distribution.—Texas; Florida; Puerto Rico; Brazil, São Paulo.

Discussion.—The key (1967a: 78) distinguishes *evelinae* and *hedgpethi* by the numbers of teeth per half-row. The material from Puerto Rico (1970b) closes the gap between the maximum of 53 teeth for *hedgpethi* and the minimum of 71 teeth for *evelinae*. Also the radula of the present material with 60 teeth is intermediate.

The penial papilla of the present 35-mm specimen measures 4.5 mm. It is covered with platelets bearing spines as figured previously for *D. hedgpethi* (1967a: fig. 98,D), and has one big spine on its root and several smaller ones, equal to the 65-mm slug from Recife (Fig. 43). The size of the penial papilla corresponds to that in *evelinae*, the numerous spines to *hedgpethi*. After changing the labels of the present specimens several times, I consider it most reasonable to unite these two nominal species, which no longer can be distinguished clearly.

23. *Discodoris pusae* Marcus, 1955

Fig. 44

References.—Marcus, 1967a: 82; 1969b: 21; 1970b: 64.

Material.—Brazil: 0°25'S, 47°17'W, 23 m, 8. XI. 1967, one specimen.

Further Distribution.—Florida; Puerto Rico; Brazil, São Paulo; Argentina, 40°56'S. Intertidal to 68 m.

Descriptive Notes.—The preserved animal was pinkish orange, 9 mm long, 5 mm broad, and 5 mm high. The notum is covered with densely set, flat tubercles, and contains scattered brown chromatophores. Such occur also in the rhinophores, which have about 20 leaflets. The six bipinnate gills have darker brown rhachises.

On the labial cuticle there are two areas 750μ by 800μ of blunt, stratified rodlets, 60μ high and 7μ in diameter. The radula measures 2.5 by 1 mm; it has 24 rows of 12.12.0.12.12 teeth. The innermost tooth is 150μ long, the eighth from the rhachis is the largest, 260μ long. Outwardly the size decreases, and the teeth change their aspect gradually from the lateral hooks to the marginal, finely denticulate, spoon-shaped plates (Fig. 44).

The reproductive organs are well developed. There is a large prostate, and the characteristic spines in the duct of the atrial gland are present.

***Percunas*, gen. nov.**

Diagnosis.—Discodoridinae with spiculate body; labial cuticle with four areas of labial rodlets; all radular teeth hook-shaped. Prostate massive. Several darts in muscular diverticula and multiple glands annexed to male duct. Penial papilla unarmed.

Type-Species.—*Percunas multiciber*, spec. nov.

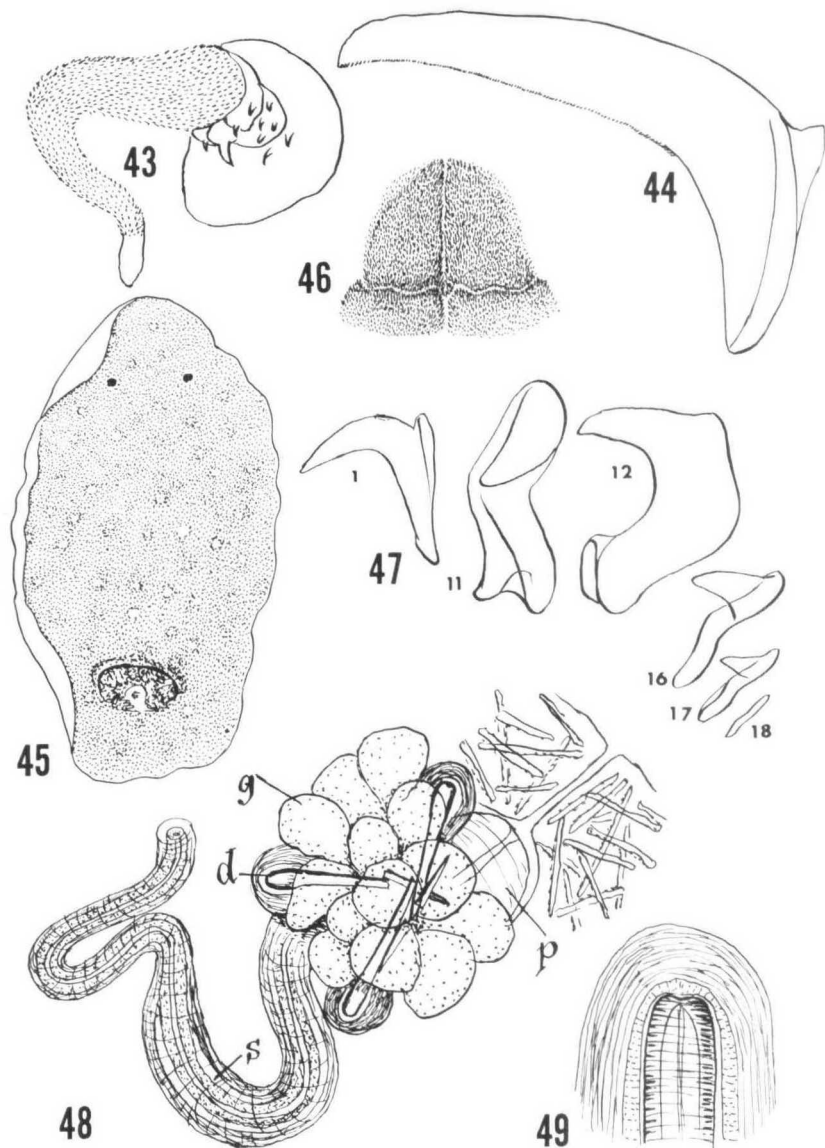
The genus can be allotted to the Discodoridinae as defined and listed by Odhner (1926: 54), emended 1939 (p. 26). In the meantime, we have described a number of new genera of the Discodoridinae: *Taringa* (Marcus, 1955: 151); *Sebadoris* (Marcus, 1960: 904); *Tayuva* (Marcus, 1967a: 191); and *Nuvuca* (Marcus, 1967b: 621). The present genus must be compared only with those Discodoridinae that have labial rodlets. The genus *Audura* Bergh (1878: 567), has denticles on the lateral teeth and lamellar marginals, thus differs from the genus *Percunas*. The following genera have simple hamate laterals, but also differ from the genus *Percunas*: *Discodoris* Bergh (1877: 518) has no accessory dart. *Fracassa* Bergh (1878: 598) has two labial plates with rodlets, not four, and no darts nor accessory glands. *Nirva* Bergh (1905: 117) has 6 unipinnate gills. *Sebadoris* Marcus (1960: 904; and in press), has a spiral penial papilla with two rows of knobs. *Tayuva* Marcus (1967a: 191; 1970a: 166; 1970b: 65) has a bundle of spicules in the vestibulum.

***Percunas multiciber*, spec. nov.**

Figs. 45-49

Material.—Brazil: $00^{\circ}04'S$, $44^{\circ}35'05''W$, 52 m, 6. XI. 1967, one specimen.

Description.—The preserved specimen is flat (Fig. 45). It measures 19.5 mm in length, 11 mm in breadth, and 6.5 mm in height. The borders of the notum, stiffened by spicules, are expanded, 3.5 mm wide, rounded in front and behind. The sole is 16 mm long and 4 mm wide. The notum is smooth, with scattered low bosses produced by the notal glands. There are groups of small melanophores, interrupted over the yellowish glands. The underside



FIGURES 43-49.—43, *Discodoris evelinae* Marcus, penial papilla.—44, *Discodoris pusae* Marcus, marginal tooth of radula.—45-49, *Percunus multiciber*, gen. et spec. nov.: 45, preserved animal; 46, labial plates; 47, radular teeth; 48, male duct; 49, base of dart. (d, dart; g, annexed glands; p, penis; s, sheathed part of penis.)

is white. The rough spicules are 0.4 mm long, or more. They do not stand out. The borders of the rhinophoral pits have about 10 small lobes; the rim of the branchial pouch is smooth. The rhinophores have 15 stiff and pigmented foliations. There are six multipinnate yellowish gills with pigment on the rachises. The tentacles are pointed. The bilabiate anterior border of the foot is not notched, the hind end is blunt.

The labial cuticle bears two anterior and two posterior areas (Fig. 46) of stratified rodlets, 7μ in diameter and up to 130μ long. The radula has 45 rows with 18 hook-shaped teeth per half-row. Their bases are bipartite (Fig. 47), similar to those figured by Bergh for *Kentrodoris gigas* (1876: pl. 50, figs. 18, 20). The stomach is free.

The male duct (Fig. 48) passes through a massive prostate, then through a muscular sheath (*s*), and opens by a blunt, fleshy penial papilla. Annexed to the duct there is a cluster of multicellular glands (*g*), and three darts (*d*), whose bases lie in muscular pockets (Fig. 49). The darts are 0.5 mm long, and 40μ in diameter at their base.

I was unable to investigate the female ducts and vesicles embedded in the brittle female mass.

SUMARIO

OPISTOBRANQUIOS DEL NORTE DE BRASIL

Una colección de 40 especies de opistobranquios reunidos por el Dr. Marc Kempf procedentes de las costas septentrionales del Brasil, de profundidades hasta los 370 m, aumenta la lista de opistobranquios brasileños (Marcus, 1964: 1969a) en 14 conocidos y 3 nuevas especies, una de éstas es asignada al nuevo género *Percunas*. Las especies nuevas son: *Chromodoris kempfi*, *Hypselodoris marci* y *Percunas mulciber*. Doce de las especies ahora reportadas en Brasil eran ya conocidas en el Caribe, otra en Cape Horn y otra en el Mar Mediterráneo. Este trabajo cubre 24 de las especies obtenidas. Las que no necesitan comentario no son mencionadas.

LITERATURE CITED

ABBOTT, R. TUCKER

1954. American Seashells. (3rd printing.) D. van Nostrand, New York, xiv + 541 pp., 40 pls.

1958. The marine mollusks of Grand Cayman Island, British West Indies. Monogr. Acad. nat. Sci. Philad., No. 11: 1-138, pls. 1-5.

AGUAYO, C. G. AND HARALD A. REHDER

1935. New marine mollusks from Cuba. Mems Soc. cub. Hist. nat. 'Felipe Poey,' 9: 263-268, pl. 24.

BEEMAN, ROBERT D.

1968. The Order Anaspidæa. Veliger, 3 (Suppl. 2): 87-102, pl. 2.

BERGH, RUDOLPH

1876. Malacologische Untersuchungen, 2. In Semper, C., Reisen im Archipel der Philippinen. Zweiter Theil. Wissenschaftliche Resultate, No. 10: 377-427, pls. 49-53.

1877. Malacologische Untersuchungen, 2. In Semper, C., *op. cit.*, No. 12: 495-546, pls. 58-61.
1897. Malacologische Untersuchungen, 5, 4. Abt., 1. Abschnitt, Die Pleurobranchiden, 3. In Semper, C., *op. cit.*, 7: 1-115, pls. 1-8.
1900. Malacologische Untersuchungen, 5, 4. Abt., 2. Abschnitt, Tectibranchia, Lophocercidae, Ascoglossa. In Semper, C., *op. cit.*, 7: 159-208, pls. 13-16.
1901. Malacologische Untersuchungen, 5, 4. Abt., 3. Abschnitt, Bullacea, 1 & 2. In Semper, C., *op. cit.*, 7: 209-312, pls. 17-24.
1902. Malacologische Untersuchungen, 5, 4. Abt., 4. Abschnitt, Ascoglossa (err. pro: Acteonidae), Aplysiidae. In Semper, C., *op. cit.*, 7: 313-382, pls. 25-29.
1905. Die Opisthobranchiata der Siboga Expedition. Siboga Exped., Part 50: 1-248, pls. 1-20.
1908. Malacologische Untersuchungen, 6, 3. Lief. In Semper, C., *op. cit.*, 9: 118-178, pls. 9-12.
- BOETTGER, CAESAR R.
1955. Die Systematik der euthyneuren Schnecken. Verh. dt. zool. Ges., 1954: 253-280.
- BULLIS, HARVEY R., JR.
1956. The genus *Scaphander* in the Gulf of Mexico and notes on the western Atlantic species. Bull. Mar. Sci. Gulf & Carib., 6: 1-17, 2 pls.
- CLARKE, ARTHUR HADDLETON
1962. Annotated list and bibliography of the abyssal marine molluscs of the world. Bull. natn. Mus. Can., No. 181: 1-114, 2 maps.
- DALL, WILLIAM HEALEY
1889. Reports on the results of dredging by the U.S. Coast Survey Steamer "Blake." Report on the Mollusca. Part 2. Gastropoda and Scaphopoda. Bull. Mus. comp. Zool. Harv., 18: 1-492, pls. 10-40.
1927. Small shells from dredgings off the southeast coast of the United States by the United States Fisheries Steamer "Albatross" in 1885 and 1886. Proc. U.S. natn. Mus., No. 2667, 70(Art. 18): 1-134.
- GUIART, JULES
1901. Contributions a l'étude des gastéropodes opisthobranches et en particulier des céphalaspides. Mém. Soc. zool. Fr., 14: 5-219, pls. 1-7.
- HOFFMANN, HANS
1932- Opisthobranchia. Bronn's Kl. Ordn. Tierreichs. Band 3: Mollusca;
1940. Abt. 2: Gastropoda; Buch 3: Opisthobranchia; Teil I, xi + 1247 pp., 1 pl. Teil II, 90 pp.
- HURST, ANNE
1965. Studies on the structure and function of the feeding apparatus of *Philine aperta* with a comparative consideration of some other opisthobranchs. Malacologia, 2(3): 281-347.
- IHERING, H. VON
1877. Vergleichende Anatomie des Nervensystems und Phylogenie der Mollusken. Leipzig, x + 290 pp., 8 pls.
- JOHNSON, CHARLES W.
1934. List of marine Mollusca of the Atlantic coast from Labrador to Texas. Proc. Boston Soc. nat. Hist., 40(1): 1-204.
- JONG, KEES M. DE AND INGVAR KRISTENSEN
1965. Gegevens over mariene gastropoden van Curaçao. Corr. Bld. Nederl. malac. Veren. Rivon-Mededel., No. 218, 56 pp., 5 pls.

LACAZE-DUTHIERS, H. DE

1898. Les ganglions dites palléaux et le stomatogastrique de quelques Gastéropodes. Archs zool. Exp., Sér. 3, 6.

MCGINTY, THOMAS L.

1955. New marine mollusks from Florida. Proc. Acad. nat. Sci. Philad., 107: 75-85, pls. 1-2.

MACNAE, WILLIAM

1962. Notaspidean opisthobranchiate molluscs from South Africa. Ann. Natal Mus., 15: 167-181.

MARCHE-MARCHAD, I.

1956. Sur une collection de coquilles marines provenant de l'Archipel du Cap Vert. Bull. Inst. fr. Afr. noire, Sér. A, 18(1): 39-74.
1958. Nouveau catalogue de la collection de Mollusques Testacés marins de l'IFAN. Cat. Inst. fr. Afr. Noire, No. 14: 1-64.

MARCUS, ERNST, OR EVELINE AND ERNST

1955. Opisthobranchia from Brazil. Bolm Fac. Filos. Ciênc. Univ. S. Paulo, Zoologia, 20: 89-262, pls. 1-30.
1958a. Notes on Opisthobranchia. Bolm Inst. Oceanogr., S. Paulo, 7 (1956): 31-78, pls. 1-8.
1958b. On western Atlantic opisthobranchiate gastropods. Am. Mus. Novit., No. 1906, 82 pp.
1959. Some opisthobranchs from the northwestern Gulf of Mexico. Pubs. Inst. mar. Sci. Univ. Texas, 6(1960): 251-264.
1960. Opisthobranchia aus dem Roten Meer und von den Malediven. Abh. math.-naturw. Kl. Akad. Wiss. Mainz, 1959(12): 871-934.
1962. Studies on Columbelloidea. Bolm Fac. Filos. Ciênc. Univ. S. Paulo, Zoologia, No. 24: 335-401, 8 pls.
1963. Opisthobranchs from the Lesser Antilles. Stud. Fauna Curaçao, 19(79): 1-76.
1964. Verzeichnis der euthyneuren Meeresschnecken Brasiliens. Beitr. neotrop. Fauna, 3(3): 195-206.
1967a. American opisthobranch mollusks. Stud. trop. Oceanogr. Miami, 6: viii + 256 pp., 1 pl.
1967b. Opisthobranchs from the southwestern Caribbean Sea. Bull. Mar. Sci., 17(3): 597-628.
1969a. Euthyneure Meeresschnecken Brasiliens (2). Beitr. neotrop. Fauna, 6(1): 1-15.
1969b. Opisthobranchian and lamellarian gastropods collected by the "Vema." Am. Mus. Novit., No. 2368: 1-33.
1970a. Opisthobranch mollusks from the southern tropical Pacific. Pacific Sci., 24(2): 155-179.
1970b. Opisthobranchs from Curaçao and faunistically related regions. Stud. Fauna Curaçao, 33(122), 129 pp.
In press. Some Gastropoda from Madagascar and west Mexico. Malacologia, 10(1).

MONTAGU

1811. Trans. Linnean Soc., 11: 184.

MORTON, JOHN E. AND N. A. HOLME

1955. The occurrence at Plymouth of the opisthobranch *Akera bullata*, with notes on its habits and relationships. J. mar. biol. Ass. U.K., 34: 101-112, pl. 1.

ODHNER, NILS HJALMAR

1924. New Zealand Mollusca. Vidensk. Meddr dansk naturh. Foren., 77: 1-90, pls. 1-2.
1926. Die Opisthobranchien. Further zool. Results Swed. Antarct. Exped., 2(1): 1-100, pls. 1-3.
1932. Beiträge zur Malakozoologie der Kanarischen Inseln. Ark. Zool., 23A(14): 1-116, pls. 1-2.
1939. Opisthobranchiate Mollusca from the western and northern coasts of Norway. K. Norske Vidensk. Selsk. Skr., 1939, No. 1: 1-93.

PELSENEER, PAUL

1894. Recherches sur divers Opisthobranches. Mem. Cour. Cl. Sci. Nat. Acad. Roy. Belgique, 53: I-III, 1-157, pls. 1-25.

PERRIER, RÉMY AND HENRI FISCHER

1911. Recherches anatomiques et histologiques sur la cavité palléale et ses dépendances chez les Bulléens. Annls Sci. nat., Zool., Sér. 9, 14: 1-190, pls. 1-9.

PILSBRY, HENRY AUGUSTUS

- 1893- Order Opisthobranchia, Suborder Tectibranchia. In Tryon, G. W., 1895 Jr., Manual of Conchology, 15: 134-436, pls. 18-61.
1895- Philinidae, etc. In Tryon, G. W., Jr., Manual of Conchology, 16, 1896 vii + 262 pp., pls. 1-74.

PRUVOT-FOL, ALICE

1951. Révision du genre *Glossodoris* Ehrenberg. Journ. Conch., Paris, 91: 76-164.
1954. Mollusques Opisthobranches. Faune de France. Volume 58. Paul Lechevalier, Paris, 460 pp., 1 pl.

REHDER, HARALD A.

1939. New marine mollusks from the West Atlantic. Nautilus, 53: 16-21, pl. 6. (Not seen; cited from Zool. Record.)

ROCHEBRUNE, A. T. DE

1881. Diagnoses de mollusques nouveaux propres a la Sénégalie. Bull. Soc. philomath., Sér. 7, 7: 172-183. (Not seen; cited from Zool. Record, 20[1883].)

SMITH, EDGAR ALLAN

1872. Remarks on several species of Bullidae, with descriptions of some hitherto undescribed forms, and of a new species of *Planaxis*. Ann. Mag. nat. Hist., Ser. 4, 9: 344-355.

THIELE, JOHANNES

1931. Handbuch der systematischen Weichtierkunde. Vol. 1. Gustav Fischer, Jena, vi + 778 pp.
1935. *Ibid.*, Vol. 2. Gustav Fischer, Jena, v + 376 pp.

USTICKE, G. W. NOWELL

1959. A check list of the marine shells of St. Croix, U.S. Virgin Islands, with random annotations. Lane Press, Burlington, Vermont, 90 pp., 4 pls.

VANATTA, E. G.

1901. Proc. Acad. nat. Sci. Philad., 53 (for 1901): 183.

VAYSSIÈRE, ALBERT

1888. Recherches zoologiques et anatomiques sur les mollusques opisthobranches du Golfe de Marseille. II. Annls Mus. Hist. nat. Marseille, Zool., 3(4): 1-160, pls. 1-7.

1898. Monographie de la famille des Pleurobranchidés. I. *Annls Sci. nat., Zool., Sér. 8*, 8: 209-402, pls. 13-28.
1903. Recherches zoologiques et anatomiques sur les mollusques opisthobranches du Golfe de Marseille. *Annls Mus. Hist. nat. Marseille, Zool., (Suppl.) 8(3)*: 69-108, pls. 2-3.
1906. Recherches zoologiques et anatomiques sur les opisthobranches de la Mer Rouge et du Golfe d'Aden. I. *Ann. Fac. Sci. Marseille*, 16: 19-90, pls. 1-4.
- VERRILL, ADDISON EMERY
1900. The nudibranchs and naked tectibranchs of the Bermudas. *Trans. Conn. Acad. Arts Sci.*, 10(2): 545-550, pl. 66.
- WARMKE, GERMAINE L. AND R. TUCKER ABBOTT
1961. *Caribbean Seashells*. Livingston Publishing Company, Narberth, Pennsylvania, x + 346 pp., 44 pls.
- WIRZ, KATHY
1952. Remarques sur l'évolution du système nerveux des opisthobranches. *Archs Zool. exp. gén.*, 88 (Notes et Revue, No. 4): 161-177.
- ZILCH, ADOLF
- 1959- Euthyneura. In Schindewolf, Otto H., *Handbuch der Paläozoologie*.
1960. Band 6, Gastropoda; Teil 2, Euthyneura. Borntraeger, Berlin-Nikolassee, xii + 834 pp.